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NEW WAYS OF LUCERNE SEED PRODUCTION

Doctor K. Zimmermann
Central Research Institute for
plant industry (Erwin-Baur Institute).
Muncheberg/Mark

The present scarcity of feed plant seeds, especially of lucerne seed, which will be difficult to solve in the future, is the result of insufficient domestic production. The way out of the difficulty, which we have been in so far, namely the import of luceme seeds, is first very costly and secondly it does not serve the purpose, since we get extractions and types of seeds which are not acclimated to our conditions and produce considerably lower harvest. Therefore, we must find ways and means to increase our own production.

The lucerne seed, with a few exceptions, so far has been produced from types which were to be used as green feed. The best green feed harvest is obtained with an interval of 20 centimeters between the rows and with 20 to 25 kilograms of seed per hectare. These conditions are the worst one can think of for seed production. Since the rows are too close together, the water reserve in the ground is just sufficient enough to support a good vegetative growth of lucerne up to florescence. If the cutting is delayed, the lucerne plants react to water shortage at once by throwing off the leaves. Germination and seed development are very incomplete. This is especially true when seed is harvested, which usually is from the second cutting. The average seed harvest from much green feed areas, which are used for seed production in case of need, is only 50 kilograms per hectare. In many cases these cultivations do not produce any seed at all, and in especially favorable years only a few hundred

kilograms can be harvested per hectare. In order to obtain this small quantity of seed, large areas must be cut and large masses of seed straw must be collected and threshed. The crop contains only about 1 percent seeds. The feed value of the straw is very low. The area used produces no cut at all, if we use the first cut for seed harvest, and one cut per year only, if we let the second cut blossom. Under such circumstances the first cut produces at the most one half of the possible annual green feed harvest. In case of an annual green feed production of 50,000 kilograms per hectare, the loss is 25,000 kilograms per hectare which can be covered by the seed harvest of 50 kilograms only if there is no other possibility for seed production.

It is obvious that this method of lucerne seed production is a most uneconomical one. We must try to organize seed production more economically. The following ways are open:

(1) Seed is harvested only in the year of sowing. The sowing (20 kilograms per hectare, 20 centimeter interval between the rows) should be done as early as possible. Late frosts should be of no concern because of the considerable frost resistance of the lucerne. Plants are not fully developed in the first vegetation year and do not use as much of the ground water reserve as older plants. Quite good seed harvests can be obtained from such areas.

(2) Seeds are occasionally harvested from older, already incomplete stocks. Along with the development of gaps advances the infestation of weeds and especially grass. The harvested weed and grass seed can be separated from the tiny lucerne seeds only with much difficulty. Lucerne has been grown only for three years in recent times so that older stock is seldom available.

In my opinion the best method is a separate seed cultivation. The success of separate seed production is a foregone conclusion for all plants whose seeds are not directly used as food or forage, as for instance beets, carrots, vegetable etc. Cultivation of these for seed products follows completely different rules than the cultivation of beets for feed or vegetables for food. The lucerne seed production must likewise follow different methods than the lucerne cultivation for green feed production.

As we have stated above, the lack of water is the main obstacle for lucerne germination. only seldom is irrigation possible. The plants in our regions are dependent mostly on the water stored in the ground during rains in winter time. If the reserve is depleted by the exuberant lucerne stock, the summer precipitations cannot replenish it. Therefore, the interval between individual plants must be extended so that the water reserve in the ground covered by one individual plant will be sufficient for germination and see development.

FIGURE 1

Individual lucerne plant from a cultivation 60x60 centimeters with a very good germination.

Local conditions will determ ne the space needed by individual lucerne plants for full seed development. Soil quality and summer climate are of utmost importance in this respect. A space of 40x40 or 50x50 centemeters appears to be the most adequate for the situation in Brandenburg (light soil, summer drought).

FIGURE 2

Individual lucerne plant from an identical cultivation as in Figure 1 with poor germination

This problem is being tested in an extensive experiment which will take several years. Information on economic seed production will be issued after the completion of the experiment. This research comprises the problems of fertilizing, sowing time and types.

The individual plants are developing very exuberantly. They reach a height of 2 meters and have numerous fruit bearing branches.

There are several technical possibilities for arranging a seed field with the 40x40 or 50x50 centimeter intervals between the plants.

(1) Direct sowing in the field. The interval between the rows is 40 to 50 centimeters and the amount of seed to be sowed is 5 kilograms per hectare. After the plants come up, the intervals of 40 or 50 centimeters are marked across the rows and hand hoed so that between marking lines only individual plant tufts remain. When the plants receive the fourth leaf, tufts are reduced to one plant per place. The field must be, of course, kept free of weeds through repeated hoeing. On larger fields with older cultivation, a horse drawn weeder might be used. The entire work requirement is not much larger han for beet cultivation.

(2) Cultivation of plants in greenhouses and hotbeds.

This method is recommended over the previous one, if one wants to have an evenly grown cultivation. Seeds are seeded in

seeding boxes like cabbage and other vegetables and transplanted into pots. It is simpler and better to seed directly into pots or cardboard pots of 8 centimeters inside diameter and place these into a moderately warm hotbed.

FIGURE 3

Individual lucerne plants from a dense cultivation. Left and middle with poor germination, right a plant from the edge with good germination.

Sowing is done during the first half of March. 625 plants per 100 square meters are needed in the field with 40x40 centimeter interval, and 400 plants if 50x50 interval is used. The required quantity of seed is very small. It is 2 grams per 100 square meters = 200 grams per hectare. The seed must be very carefully prepared, the best way is to pick it by hand, then the germination ability should be a high one. When the young plants in the pots have well developed roots they are transplanted in the field about the middle of May. The total work requirement is about the same as for sowing and transplanting early cabbage. Nursing work in the field will be reduced through a blind cultivation undertaken in time to destroy the weeds.

In all such cultivations the first generation is used for seed production. It is not very economical to cut it for green forage because of the wide interval between the plants. But the cut is not so low as one would expect, since the first cut of a cultivation with 50x50 centimeter interval between the plants produces about one half of the green feed quantity produced by the area of

the same size with 20 centimeter intervals between the rows.

Potassium and Phosphorus are used for fertilizing. The quantities depend upon local conditions but the fertilizing should not be excessive.

If an infestation with weeds, especially the over-growth of couch-grass, is carefully prevented, the seed can be harvested from such a cultivation 10 years or longer, thus the relatively high original cost is distributed over several years. Eventual bare spots can be replanted every two to three years.

Such lucerne cultivations possess a pretty strong tendency to lie down. If this happens before florescence, we cannot expect a good seed harvest. The secondary growth shades the first vegetation and hinders germination. In such a case it is better to cut the first cultivation and to use the second vegetation for seed production. Since the second vegetation always produces considerably less seed than the first one, I should like to suggest another step toward the intensification of seed production.

The interval between the plants is to be 60x60 or 80x40 centimeters. Plants will be raised in a greenhouse or hotbed and transplanted in hay. Out in the field each plant should be attached to a post, the same as used to tie up tomatoes (1.50 meter above the ground) and tied to it with twine, but not too tight in order to allow the branches with blossoms free branching. The plant must be tied three or four times so it will not overhang or settle down.

FIGURE 4

Individual lucerne fruit bearing branches well covered with hulls.

The lower ends of the poles should be impregnated with tar and the poles pulled out after the seed harvest, and again inserted in the spring. Plants which do not produce any seed during two subsequent years should be pulled out and replaced by one-year plants which have proved their seed production ability in a reserve cultivation.

One could object that the work requirements resulting from the intensification are not compensated for by greater success. However, I have figures proving that lucerne seed production increase by the proposed method justifies the work requirements. Even the work requirement per 100 kilogram of produced seed is lower with intensive than with extensive methods.

As mentioned above, the average seed yield of a drill cultivation, with 20 centimeter interval between the rows and 20 to 25 kilograms of seed per hectare, is about 50 kilograms per hectare and varies between 0 and 300 kilograms per hectare.

About 500 kilograms of seed was harvested from a cultivation in Muencheberg, with 50x50 centimeter interval between plants, when the cultivation was in its first year. The plants were not tied up because it is not absolutely necessary during the first year.

From a cultivation in Muencheberg with a 60x60 centimeter intervall between plants, was harvested in the first (1949) 200 kilograms of seed per hectare, in the second year (1950) 1,200 kilogram of seed per hectare.

FIGURE 5

Raising individual lucerne plants in a greenhouse. Pots were set in the ground and one grain of lucerne was put in each pot. The young plants are just coming up.

The plants were attached to the posts. The year 1949 was very unfavorable for the lucerne seed production because of the cold wheather in June: 840 kilograms per hectare were harvested from another two year old cultivation in 1950. The interval between the plants was 60x60 centimeters and the plants were tied to the posts.

A three year old cultivation with 60x60 centimeters interval between the plants produced 980 kilograms of seed per hectare.

All these cultivations were on smaller areas. The conversion into 100 kilograms per hectare contains certain errors but is used in order to obtain comparable figures.

The 60x60 interval between the plants proved to be too large. The yield from one plant was not essentially lower with a 50x50 centimeter interval, but the plants were 50 percent higher.

It seems to me that it is not too exaggerated to state that an average yield of 1,200 kilograms per hectare can be anticipated under these conditions. The value of the harvest is 10,000 DM at the present sale price of 800 DM per 100 kilograms, compared with a good rye harvest in Brandenburg of 2,000 kilogram per hectare, about 400 DM worth. The see production mentioned was achieved on an average rye soil.

The yield of lucerne seed is not the only problem of seeding. Breeding is very important for the increase of seed yield. German varieties were not selected especially for seed production. Therefore, we can positively anticipate that the current breeding experiments in Muencheberg and other places can considerably increase the lucerne seed yield without reducing the quantity of green feed. An example may illustrate it:

In 1950, from a two-year cultivation with a 60x60 centimeter interval all plants not selected for seed production were individually picked out. The average seed production per plant was 53 grams. The yield of individual plants was as follows:

Individual plants with	0-20 grams of seed	12
Individual plants with	20-40 grams of seed	28
Individual plants with	40-60 grams of seed	44
Individual plants with	60-80 grams of seed	13
Individual plants with more than 80 grams of seed		3
	Total	100

60 percent of the plants produced over 40 grams.

It should not be too difficult to increase the yield of individual plants with continued intensive selection to 70 grams under the same conditions, which would mean a yield of 1,890 kilorams per hectare.

Almost 40 times more land is required to produce the same quantity of seed with previous methods and the present varieties. Even a harvest of 1,200 kilograms per hectare, which is absolutely

possible with the approved varieties through separate seed production to 1/24 compared with the 50 kilogram per hectare harvest by the old method. The entire area saved is fully available for green feed production.

The labor requirements for harvesting and threshing are considerably reduced since the straw contains 10-20 percent seed instead of 1 percent. Smaller areas are harvested by sickel and only the upper third of the plant is cut off. The seed can completely ripen since no loss results from dissipating or birds, and the seed quality is much better.

The proposed methods for seed production are adequate mostly for smaller areas, especially to make a peasant self-sufficient in seed. Any small or middle peasant could plant and harvest a few hundred plants in his garden without difficulty. He certainly plants tomatoes but they do not produce more than the lucerne. One tomato plant yields about 1 kilogram of tomatoes at the most worth 0.50 DM. A lucerne plant, a few years of age, produces at least 50 grams of seed, which is also worth 0.50 DM. But tomatoes must be planted every year anew, while the lucerne plant can last several years.

Experience will show how good the method of separate seed cultivation for larger scale operations is. But the economic advantage is proven. If a high percentage of 30-40,000 hectares is used in the German Democratic Republic for lucerne seed production it can be fully utilized for green feed production. A surplus of green feed results, sufficient for thousands of cattle.

I should be very glad if these suggestions meet with favorable response. However, I should like to warn that the Central

Research Institute is not in a position to distribute lucerne seed since it does not produce seed in larger quantities. I am ready to give any further information required and I shall appreciate any suggestions from practical circles.

ANTIBIOTICS IN PLANTS AND ANIMALS

Doctor G. Rohde, Blankenfelde

(a) Resorption of antibiotics by plants

The successful utilization of antibiotics obtained from live soil substances, such as penicillin and streptomycin, against many dangerous pathogenic microbes in man and animals has created a new development in therapy. We do not have to chase out the devil with beelzebub at the present time, as was very often the case with the old remedies of classical chemotherapy. We can use the medicaments of nature for the destruction of pathogenic microbes. This tremendous progress was possible because man started to examine the laws of nature more and more and was able to approach nature accordingly.

Relatively little research has been done on the significance of anitbiotics produced in the soil for the resistance of plants against pathogenic microbes. The valuable results of Soviet research were extensively mentioned (No 1/50 "Die dentsch Landwirtschaft").

Brian and Wright have recently published a research which completely proves the data of Soviet researchers. (Brian and Wright: Nature 167, 347-49, 1951). Brian and Wright point out in the introduction that the main mass of soil bacteria, fungi and radiata live in the rhizosphere, and the antibiotics produced by them directly influence the roots of plants. If the antibiotics are absorbed by plants, they should develop also their activity in the above-ground parts of the plant and it should be possible

to prove their existence there Brian and Wright conducted their experiments with the antibiotic Griseofulvin, produced by the Penicillium janczewskii, which is abundantly present, and by Penicillium griseofulvum, which is less abundant in natural and cultivated soils. It can be easily proven that it is quite stable in acid soils and is not poisonous for higher plants.

When cut stalks of various plants were put into a water solution of griseofulvin, the antibiotic could be discovered in the upper leaves after 7 to 14 days. The plants could absorb griseofulvin also through the roots and carry it into the leaves. The antibiotic was also found in the water secretion of the leaves. Plants removed from griseofulvin solutions and put into solutions without griseofulvin kept on secreting griseofulvin during guttation for 3 to 4 weeks. This proves that griseofulvin is being stored in the plant. The leaves of salad plants raised on soils containing griseofulvin, secreted the antibiotic during guttation.

Griseofulvin inhibits many fungi. It has been known for some time that it, together with the antibiotic gliotoxin, prevents the development of hycorrhiza on pine wood roots. Healthy salad plants kept in a griseofulvin solution for 14 days and then infected with Botrytiscinera resulted in only 40 percent of the plants contracting the disease, while the fungus completely destroyed all test plants without griseofulvin. The salad plants, raised in solutions containing griseofulvin, possess a considerably increased resistance against Botrytis cinera. In another experiment, 74 percent of tomatoes raised in solutions containing griseofulvin were resistant against Alternaria solani.

The resistance of human beings and animals against diseases also should be increased through food and feed containing antibiotics. However, the results of intensive tests allows a definite conclusion in this respect. It should be specifically established whether enough antibiotics are produced in the fertile soil and absorbed by the plants under the conditions favorable for plant development.

(b) Antibacterial material in food and feed

It has been known for a longer time that some higher plants also contain substances inhibiting and destroying pathogenic bacteria. Freerksen and Boenicke examined 550 plant types and varieties and established that about 60 percent possess the ability to inhibit or destroy bacteria. (Freerksen and Boenicke: The Natural Sciences, 37, 564-65, 1950).

Some of the plants examined are normal food or feed plants. Since the antibacterial substances pass through the intestines and the entire metabolism and can be detected in a person or animal in active form, Freerksen and Boenicke conclude, that they are resistant against ferments and metabolism products and act antibacterially in human and animal organisms. From 47 feed plants tested on mice, guinea pigs, rabbits, dogs and cattle, acorn and plantain were especially antibacterially active. The urine of animals fed with bread was completely inactive. The urine became antibacterially active a few hours after plantain feeding and quickly and considerably increased. After the plantain feeding was stopped, the antibacterial activity of the urine slowly diminished and finally inactive urine was produced. The active substances were even more concentrated in the urine than in the

natural plantain juice. These observations indicate a new way for establishment of differences in biological value of food and feed. It should be possible to determine with this simple procedure the influence of fertilizing and especially of the addition of fertile compost soil on the content of active substances in the plants.

(c) Antibiotic substances speed up the weight increase of hogs and chickens

The gold-yellow antibiotic auremycin, obtained from the radiata Streptomyces anreofacieus, and successfully used against many dangerous human diseases, possesses a stimulating influence on the growth of hogs and chickens. The addition of aureomycin to the feed increased in feeding experiment of 54 days (Cunha T. J. : Your Farm, January 1951, 49-50), the average weight of spring pigs from 15.89 to 57.59 kilograms, while the weight of the test animals, fed the same feed but without aureomycin, was on the average 36.55 kilograms at the end of the test. Pigs fed with aureomycin gained 20.99 kilograms more than the other animals, and the daily gain was 767 grams compared with only 379 grams. The test animals needed 468 kilograms of feed for 100 kilograms weight increase and the aureomycin fed pigs only 289 kilograms. Aureomycin not only speeds up the growth but improves the feed utilization as well. It stimulates the appetite of pigs. The Aureomycin-pigs have taken 2.216 kilograms of feed daily, the test animals only 1.59 kilograms. Auremycin stimulates the pigs to eat more and to gain faster.

In addition, aureomycin prevents enteritis, which is very prevalent in pigs. The aureomycin-animals looked better than the test animals. Pregnant sows had more healthy and vigorous pigs and fewer runts when fed aureomycin. (Johnson E.L. and coworkers: Successful Farming, April 1951, 36-37) The pigs were 2.7 to 5.4 kilogram at weaning. Runts, given aureomycin, started growing just as fast as normally developed pigs. 11 miligrams of aureomycin are required per 1 kilogram of feed. A hog weighing 70 kilograms is given 30 miligram aureomycin daily. The growth of chicken can also be considerably stimulated with aureomycin. 8 week old chickens weighed 880 grams when aureomycin was added to the feed.

Other antibiotic substances such as streptomycin, terramycin and penicillin could also stimulate the growth of pigs 110 miligrams of streptomycin per 1 kilogram of feed was required, and only 5-11 miligram of other antibiotic substances. This opens a completely new research field in animal feeding which will be of great importance for agriculture. We assume that the action of antibiotics is different from that of vitamins and that they inhibit the growth of certain micro-organisms in the intestines which produce toxic substances or consume vitamins so far unknown but important for humans and animals. Other researchers are of the opinion that the antibiotics speed up the action of ferments.

It should be pointed out that apparently the desirable antibiotics are produced especially in rich fertile and well ventilated soil containing a lot of organic material and that plants, as proved first by Soviet researchers (Krassilnikoff: Agrobiology, No 2, 1949) can absorb antibiotics and store them in leaves.

Therefore, it is probable that our domestic animals regularly receive small quantities of antibiotics through feed plants raised on fertile soils. This new research field could perhaps simply and satisfactorily explain why animals fed feed from fertile humus-rich soils better utilize it and are more resistant against pathogenic bacteria.

THE AGRICULTURAL TECHNICAL LITERATURE AND THE FIVE-YEAR PLAN

H. G. Wosseng, Berlin

Educational work must be increased on awide basis among peasants in order to achieve increased harvest yields in the production of milk, fat and meat as provided for by the Five-Year Plan. The economic consultants of the VdgB (BHG), agricultural a ents of the MAS and people's farms and agricultural teachers should be primarily engaged in this educational work. Accordingly, the first important task before us is to teach the peasant and the agricultural worker the latest theoretical and practical results of agricultural science. The methods of the progressive Soviet scientists Mitchurin, Lyssenko, Wiljams among many others should be widely applied.

The success of this educational work is to be a great extent dependent upon the availability of appropriate agricultural technical literature. Technical books and periodicals must include and clarify the existing problems to a greater degree than previously. Special attention should be paid to the timely publication of certain articles and booklets. If we take into consideration the agricultural technical literature published so far we must observe that the publishers could not always distinctly understand the preferential nature of certain tasks. Very often a text is published, which could wait for a later date, while such problems which deserved early published because of their special importance are insufficiently treated or remain unpublished. In this connection we point out only works on agriculture, plant and animal industry and science feeding to mention at least the most important subjects.

However, in presenting these things one should not overlook the difficulties connected with the publication of a basic technical book. But it seems to be better to use the existing and repeatedly proven literature, if possible, and to publish it in revised form, when necessary, than to leave a gap open for years until the manuscript for a new work is completed.

The publishers should select authors with more courage and determination. Young authors are not adequately taken into consideration, although there is among the younger generation a number of scientists, who would be in a position to publish a work on this or that problem on the basis of intensive studies. These authors should find more generous personal and financial support.

It may happen that young authors under contract deliver such manuscripts which are not suitable for publication. In such a case the publisher should take into consideration the effort and work put into the manuscript by the author and a commensurate compensation should be paid so the author will not lose the courage to start preparing a new work at a later date.

Likewise authors should on their own initiative approach publishers more often than before, and propose the publication of new texts and make themselves available as authors for a specific technical field. How many manuscripts of our authors of long standing which deserve to be published still sleep in their desks. The question arises, why is it so. Don't the authors trust our publishers, our production quality, or are they moved by the financial reasons not to offer their works.

In this connection, let us first tackle the question why the original works of our university institutes are very often published in the west and therefore are not available to the majority of our specialists. It is a shame indeed that research results, financed with the money of our working people, are not available to us and therefore cannot be practically utilized. This should be basically and finally clarified. This problem would disappear in a unified Germany. Our agriculture needs those research results at the present time. Therefore, it is necessary that the newly founded German Academy of Agricultural Science publishes technical periodicals for the individually specialized fields which will cover publication of research results of our scientists. Furthermore, we should explore the possibility of acquiring the licence for publication of special books of known authors, which we do not have but which are suitable for our economic situation and are published in West Germany.

The translations of original Soviet works are of special importance. The German Peasant Publishing Enterprise started this with the publication of the series, A Look into Soviet Agriculture: This work should be continued on a wider basis in the future and especially works of progressive Soviet agricultural scientists should be made available to our working peasants in the form of popular and easily understandable translations.

There are sometimes in practice, problems requiring a quick solution, as for instance the problem of fighting certain plant pests or the problem of plowing of meadows etc. In such cases we should publish these acute problems in leaflet form in order to inform every last peasant and agricultural worker of the measures

that should be taken.

It appears the most urgent task is to call authors into a central conference as soon as possible in order to discuss the problem of agricultural technical literature which should be published soon. Such a conference will give impetus to all and will create better understanding between authors and publishers.

Finally, we should like to mention the most important texts which we do not have and which must be published in the near future. As already mentioned at the beginning, we need a popular book on agricultural science and plant industry where our peasants can find authoritative and most important advice for practice.

Also books on animal husbandry and feeding should be published. Furthermore, we should prepare handbooks for these scientific fields. But it would not be proper to first write a handbook and afterwards publish the technical book in a concise form since it would take too much time.

An agricultural economy for the Five-Year period is urgently needed. The working cooperative of young manufacturing engineers took the initiative in this matter and will collectively complete such an economic book by the end of summer 1951. It would be commendable if working co-operatives were established also in other scientific fields in order to complete similar projects.

There is a complete lack of literature for plant protection and weed destruction. Therefore, it is important to publish the necessary literature in this field as soon as possible.

The problem of publishing a text on oil bearing plants must be preferentially discussed. We could mention a number of texts which we do not have, for instance technical books on field vegetable production, vegetable seed production, diseases of fruits and vegetables, vegetable preserves, frost protection, trimming of fruit trees, development possibilities of orchards on poor land, the incorporation of orchards into farming, cooperative fruit sales and so on.

We can anticipate that the author conference is going to discuss these problems and that the gaps in technical agricultural literature will be closed in the near future.

RESEARCH TO INCREASE AGRICULTURAL REVENUE WITH REGARD TO THE MOST IMPORTANT AGRICULTURAL AND PLANT PRODUCTION MEASURES

Doctor H. Ruether
Land Experimental Institute
Lanchstaedt.

The Five-Year Plan has given agriculture special tasks in order to create better living conditions for all working people. It is possible to fulfill these tasks only if there is good cooperation between science and practice supplementing each other. In this respect agricultural research must provide the working farmer with adequately proven results in proper form as rapidly as possible. There are various ways and means of accomplishing this, but the aim here is to discuss those in the area of agricultural production in the following analysis:

(1) One of the most important conditions for increasing the agricultural income is the proper establishment of crop rotation. And in this respect many things have been overlooked in the past. The results of the new crop rotation experiments show that this area contains the largest yield reserves. The new experiments with crop rotation have shown in the first year the influence of various agricultural plants used as early crops. The following yields were achieved in Lanchstaedt following various early crops.

Early Crop 1947		1948 winter wheat grain 100 kg/ha	1949 Potatoes (in manure) clean 100 kg/ha	1950 Oats clean grain 100 kg/ha
Potatoes "Voran"	in manure	42.3	187.0	42.7
Potatoes Hoehms middle early	in manure	45.1	200.6	41.5
Peas	without manure	43.3	214.8	41.7
Oats	without manure	38.0	198.2	40.6
Winter wheat	without manure	33.1	206.9	41.6
Winter rye	without manure	31.4	212.0	40.3

The results show especially good early crop value of leaf plants, primarily of legumes and early potatoes. A favorable early crop influence of peas can also be seen on the basis of these yield figures in the 1949 and 1950 experimental years, but it is reached in 1950 by the early potato crop in manure. Healthy crop rotation is an indispensable condition for the maintainance of soil fertility. Seeding plans are under constant supervision of the Saxony-Anhalt Land Government in order to introduce those important results into agricultural practice as rapidly as possible and to exploit the yield reserves. The ideal proportion is 50 percent leaf plants and 50 percent grain. The working farmer ultimately will accept these achievements following the example of the people's farms. There is no doubt that in this manner the yield can be increased without additional cost. The only condition is, of course, intelligent planning.

(2) Proper soil cultivation is closely connected with this problem. It is of special importance in the central German arid area (rain shadow of the Harz mountain). It is very important to understand the proper time for cultivation. The climactic conditions of a large part of Land Saxony-Amhalt (Rain shadow of the Harz mountain) require careful soil cultivation in the interest of water economy. It starts with the grain harvest. The old saying that the plow should follow the grain wagon is of special significance for water economy of the soil and for weed control. The importance of deep cultivation also should be pointed out here since it was proved by soil cultivation experiments on the Land experimental farms and on the university farms. It is of great importance especially on lighter soils to break up the lower soil strata, where it is not possible to plow too deeply.

One of the most important prerequisites for the growth of summer cultivations is autumn and winter plowing. It should be the rule of every farmer to plow as much as possible in autumn in order to achieve the following advantages:

(a) Enrichment of the soil with winter moisture.

(b) Creation of an ideal fermentation situation in the soil (frost fermentation).

(c) The possibility of spring cultivation in order to avoid water loss.

(d) Early seeding of all cultures - except those sensitive to cold - with full utilization of winter moisture.

(e) The achievement of highest yields of summer cultivations. Their advantages are shown in the following test results of seeding time, conducted for many years in Lanchstaedt:

Yield Decreas As a Result of Late Seeding Based on Seed-time Tests Over Many Years(1)

[(1) H. Ruether: Early Seeding Increases the Yield Karteikurzberichte Erfurt, March 1950]

	Percent	Percent Grain	Percent Straw
(a) Summer wheat		53.3	21.4
Peas		50.7	43.4
Lupine		39.8	-
Sugar beets	Beets	Sugar	Leaves
	26.4	25.5	22.1
(b) Summer oleaginous fruits		Grain	Fat
Poppy		28.4	48.5
Linseed		22.9	22.7
Flax seed		18.7	20.4
Mustard		19.9	17.2

According to these results early seeding of summer cultures hides a considerable yield reserve, which is not exploited adequately in practice as yet.

(3) There are also large potentials hidden in the selection of the best varieties for individual cultivations. The results of a variety of tests over many years show the great importance of variety and output tests. I have computed the yield differences between best and worst varieties on the Basis of those results and have

obtained the following:

Yield reserve in percent for: (2)

[(2) H. Ruether: Yield reserves and variety selection, Karteikurr berichte Erfurt, June 1950]

Winter barley	25 percent	Peas	74 percent
Winter wheat	48 percent	Linseed	19 percent
Winter turnips	4 percent	Sugar beets	13 percent
Summer wheat	40 percent	Feed beets	9 percent
Summer barley	21 percent	Potatoes	50 percent
Oats	9 percent		

These figures actually show surprising yield differences of individual cultures which vary for individual varieties. They are especially high for peas and potatoes. Therefore the proper varieties of these plants should be selected with special care. Variety tests should be conducted on a wide basis, that is, in various places and under different climactic and soil conditions. The limitations of their cultivation will be established and a guarantee for proper advice to the practice obtained. The Lanchstaedt Land Experimental Institute together with the attached Land experimental farms, which are distributed over the entire Land Saxony-Anhalt, took over the task to correctly advise agriculture on the basis of extensive variety tests. Also the newly created testing groups have very important tasks in this respect. The task of plant raise highly productive, cold and disease resistant stable, early and late varieties as well as to study and process the yield factors which are more or less subject to climactic influences.

(4) The production of high grade seeds for higher type cultivation is also an important duty of the people's farms, experimental farms and university farms. The creation of seed producing groups in village cooperatives should be promoted in order to increase the production of commercial seed and to achieve the desirable stable exchange of seed.

(5) Soil examination, that is, a systematic soil examination becomes increasingly important in order to establish the fertilizer requirements or the main nutrient content of the soil which is necessary for plant growth. Only a simultaneous, systematic examination of all the land of an enterprise or village, that is, a regular average test of every field, gurantees the result and justifies its practical application. In connection with this, we should like to point out the reprint by W. Selke, Lanchstaedt Land Experimental Institute (Reprint from the periodical for plant nutrition, fertilizing, soil science, Volume 48, No 3, 1950), which contains all details for the application of soil examination results by the individual farm.

It is an enjoyable fact that the Five-Year Plan provides for a complete supply of mineral fertilizers for agriculture in needed quantities. But at the same time increased attention should be paid to the fertilizer produced on the farms themselves.

(6) The weed control in our fields is of the greatest importance. It can be accomplished first through timely and careful plowing and then through proper care of cultures and cultivating. The recent experiments of the Land Experimental Institute have proven the favorable influence of this work on plants, which

require cultivation, and on grain as well.

The new weed killers (preparations on hormone basis) D 24 (produced in Bernburg), H 11 and H 22 (Bitterfeld-Wolfen products) have shown a surprisingly favorable action. They are able to kill weeds such as hedge-mustard even when they blossom. These experiments were conducted with best results by the Land experimental farms, university farms and experimental groups in accordance with the acquired experiences and achieved results. These preparations will be ready for practical application very soon if the industry will be able to produce in the quantities required.

We have emphasized only the most important points of agricultrual and grass production but we already can see how numerous the possibilities are to increase the yield per hectare and thereby the entire agricultural production. It is decisevely important to bring the results of agricultural science to every farm. The exchange of experiences among the farmer already organized by some machine tractor stations is very well accepted by many farmers. The duties of the institutes and experimental farms should not be limited to experiments only but they should become a strong link between science and practice. There are various possibilities for it:

(a) Visiting the experimental fields so the farmers can get acquainted with experimental results and their practical utilization. With this in mind, more and more experts from the experimental farms will be included in the advisory service according to their experiences;

(b) Field celebrations in villages promote the mutual exchange of experiences, critiques and self criticism should help to find better methods.

(c) Lectures and discussions at farmer meetings, organized by the VdgB (BHG) (Village Cooperatives) and experimental clubs, intensify and spread the contact between science and practice. The vocational schools with adequate expert clubs for agriculture can render a blessed service in this respect.

(d) The newly organized experimental clubs, of which there are about 30 back in action in Saxony-Anhalt, whould conduct economical and animal feeding experiments in addition to the usual agricultural and grass raising tests and also establish the Mitchurin fields. This will enable the farmers to apply the recent experiences of agrotechnique to their farms;

(e) The newly established German Academy of Agricultural Science provides a unified basis for agricultural research for the purpose of serving agriculture.

When first we explore all the possibilities for the production increase in agriculture and then exploit them, we will have all prerequisites needed to fulfill the tasks established for agriculture by the Five-Year Plan, and to insure a better living standard for all working people.

UNEDITED

A NEW METHOD FOR PEST CONTROL

Doctor H. Tielecke, Aschersleben

The usual method for protection of cultivated plants from pest attack with chemical compounds was to cover them with a layer of poison either in the form of powder or spray, applied with especially constructed apparatus. Arsenic compounds which act only by mouth, dominated the field for a long time. Efforts have been made for a long time to discard these compounds because of their high toxicity for man and domestic animals. These efforts earned the first success when we learned that substances obtained from plants as pyrethrum, derris, guassia and nicotin killed the animal parasites on cultivated plants merely by contact. All these substances, except nicotin were not poisonous either for man or animals. However, there was an economic disadvantage: we had to import raw material for the production of these insecticides.

Almost revolutionary was the 1940 Swiss discovery of a contact insecticide (killing of insects on contact), which was a synthetic benzol compound (Dichloroli-phenyltrichlormethylmethan) and was later called DDT. This compound exceeded the natural substances and was practically untoxic also for warm blooded animals. The familiar commercial products Gesarol, Gesapon and the products Duolit and Mux, used for vermin control, contain that active ingredient. Only 2 years later the contact insecticide ability of another benzol compound was discovered in France and England. It was the benzolhexachloride contained in commercial products Verindal, Arbitex, Hexitan and the like. The German discovery in 1944 of the E compound (Ester compound of the phosphoric acid) represented

an additional important step compared with the previously known new insecticides. This compound is used in West Germany as E 605 powder or E 605 forte spray, and in the German Democratic Republic as Wofatox powder or spray.

The superiority of these E compounds is based on their deep action, which the DDT does not possess and the Hexa compounds only insignificantly. The deep action of the E compounds means, that they are able to penetrate into the inside of the plant and thereby kill larvae feeding inside the leaves, for instance, of beet leaf hopper, or insect larvae living in leaf-stalks and stems, for instance the turnip fly. The E compounds also successfully destroy the leaf lice, mostly sucking the lower surface of leaves with its ability to penetrate deep. The E compounds are generally accepted as the most successful insecticides for leaf lice. The application area of the Ester Compounds has been enlarged but t is success also increased their toxicity for man and animal. The toxicity is still less than that of arsenic compounds so the use of the E compounds does not have to be restricted but they should be carefully handled.

The excellent depth action of the E compounds suggested the testing of a new application method in plant therapy. So far it has been reserved for the human and veterinary medicine to bring substances into the blood stream of the ill organism in form of tablets or through injections. These substances had no negative influence on the sick organism but they were able to kill the pathogenic bacteria in it and thereby cure it. I mean especially the sulfa drugs as Prontosil, Eubasin, Albucid and others, which are so much used in human therapy, and also the well known Penicillin. There are many reasons, why this method has not been used for pest

control as yet and we will discuss briefly only one.

Human and animal organism are characterized by a closed blood vessel system which uninterruptedly transports the substances to all parts of the body. The concentration of blood liquid is almost constant. The situation in plants is completely a different one. They have two separated transmission lines: one carries the juice from the root to the parts of the plant above ground, the other carries juice from the leaves to the root or to other storage parts of the plant. The first juice stream containes inorganic salts only in low concentration (0.1 percent), the other carries higher concentrations of organic substances. Dead, wooden cells compose the ducts for the inorganic juice stream, while alive filter cells, covered with protoplasma line the organic ducts. If the plant absorbs certain substances and one of the transportation systems carries them, it does not necessarily mean that the second system will take them over. The absorption of the active substances also depends on certain conditions. The injecting of active substances, as it is done in human and veterinary medicine, would be economically permissible only in case of pest control on fruit trees. Such a method would be inpractical and too expensive for the plant cultivations in fields. In these cases only such substances which can be absorbed through roots or leaves can be used.

In regards to the Ester compounds, it has been discovered that roots absorb them and the inorganic juice stream carries them into above-the-ground parts of the plant. This fact was utilized by Hofferbert and Orth in Germany who tried to protect the potato plant against peach leaf lice [pfirrichblattlans] through internal therapy. They added Ester compounds to the soil and within 4 days,

21 percent of the lice died on the leaves of potato plants, which absorbed the compound through their roots. This type of pest control with the available Ester compounds has to overcome certain difficulties. The inorganic juice stream carries the Ester compounds but the organic stream does not. Furthermore, ferments decompose the Ester compounds within a few days so that the therapeutic action is of short duration.

After this initial success, a substance should be discovered, (1) which can be absorbed by the plant through leaves and roots, (2) which will be carried by both transportation systems in the plant and (3) which will not be destroyed by the plasma of the living plant cells so that it can retain its activity for a longer time and make the plant immune against pest attack. In addition, such a substance should not have any negative influence on the plant itself. It was reserved for the German researcher Schrader, who is the discoverer of the Ester compounds, to find a substance, which meets the above mentioned conditions. The substance was named "Schradan" in his honor. This is also a phosphorus compound. The action is increased to several weeks. It is of special importance for control of leaf lice, which with a very few exceptions attack all cultivated plants, that the living filter cells of the organic juice stream also carries these substances. The leaf lice, which suck the plant juice, almost exclusively tap the duct system formed by filter cells with their sucking organ. So they take in poison and get killed. The long duration of this substance also is important for leaf lice control. Because of the high multiplying ability of leaf lice through the parthenogencois (development of eggs without fertilization) only a few lice, which escape, can cause a mass invasion within a short

time. As we have mentioned, the substance is active very long so that a renewed mass multiplying can be completely prevented. It should be pointed out that the substance does not kill the natural enemies of the leaf lice as for instance the lady-bird.

This new control method, the so called internal therapy, represents another very important progressive step.

We know that rain washes off chemical compounds used in the treatment of plants, thus the treatment must be repeated. This disturbance does not exist with internal therapy. There is no doubt that this method has great advantages. Although there are many problems to be solved before the method leaves the experimental phase and becomes ready for practical use, we can state that the possibility of protecting our cultivated plants through internal therapy has become a reality. This method represents great progress in pest control but we should not expect it to solve all problems.

UNEDITED

THE RESULTS OF SOVIET AGRICULTURAL SCIENCE HELP THE FULFILLMENT OF OUR FIVE-YEAR PLAN

By Doctor O. Baumgarten, Berlin

A delegation of agricultural scientists of the German Democratic Republic visited the Soviet Union on behalf of the Central Committee of the Socialist Unity Party [sed] at the beginning of this year. The delegation had the opportunity to study institutions of Soviet agricultural science.

The Soviet agricultural scientists have informed us without reservation of their results in extensive discussions conducted in a friendly spirit. The meeting with Lyssenko personally represented the culmination of the study trip, which was of greatest importance for the development of our agricultural science.

What great success will be possible in our agricultural production when we stop considering our cultural plants as something isolated, but will see them in the complex "Plant and surroundings". The Travopolnaja system of Williams is of greatest importance. The great transformer of the nature hitchurin continued examining the mutual relations between plant and surrounding and developed the rules on which the development of new plant forms is based. But these do not develop accidentally any more, only those forms develop which man desires.

The life work of the Academy member, Williams, was devoted to the fertility of soil. It is in his opinion one of the main factors for quality and quantity increase of agricultural production. Doctor Ruebensans of Muencheberg, who participated in the study trip

to the Soviet Union, has indicated in his booklet "The Travopolnaja System of Williams" the applicability of this system in German agriculture. Another agricultural scientist from the German Democratic Republic, Professor Doctor Voenneckse, University of Halle, has also examined the application possibility of the system under German circumstances (I point to his article in this volume on page 451).

The role of the factor "light" for the production of large harvests has been so far underestimated in considering the factors influencing the life of plants. The well known agricultural scientist Timirjaseff said: "The amount of sun energy assimilated by our cultural plants, serves as best, basically as the only measurement for the capacity of these cultivations". A change of the intensity and length of sunshine unavoidably changes the air and soil temperature and thereby causes a variable intensity of evaporation as well as air and soil moisture. Changes appear in the living functions of the plants which thereby favorably or unfavorably influence the output of our cultivations. There is, for instance a certain relation between spread, that is, how far apart are the rows of a cultivation, and yield of a cultivation, but its effect also depends upon the age of the plants. Therefore, we have to take into consideration in this research the changes of the total complex growth conditions when the interval between the plants changes. According to the age of the plant its requirements change for light, temperature, air and soil moisture and also for water, mineral and carbon dioxide.

Cross-seeding of grain in north-south rows increases the utilization of sun energy according to the experiences in the Soviet Union. Thus, plants have more light morning and evening and more

shade at noon. In addition to the increased yield, quality is improved.

Another factor, which was not paid proper attention previously, is water. The production of larger harvests means a higher water consumption by plants. Accordingly, the amount of water available from precipitations should be rationally utilized. Only one third of the vegetation water was productively utilized previously. This degree of utilization must be increased through achievement of a better soil structure with the Travopolnaja System.

Member of the Academy, Lyssenko, has directed our attention to the possibility of yield increase with granulated fertilizers, especially in case of superphosphate. Lyssenko's advice is being applied on a wide basis in the Soviet Union and it is urgent to apply these experiences of the Soviet agricultural science in our country as soon as possible. Graduated farmer Engel deals with this problem in this volume. Although P. Wagner had pointed out the advantages of roughly granulated superphosphate 70 years ago, still superphosphate is delivered in the form of fine ground powder. We have to state that scientific harvest increasing results could not find practical application, probably because the capitalist fertilizer industry, which was organized in cartels prior to 1945, was not interested in it. Our people's fertilizer industry will be in a position, after overcoming certain technical production difficulties, to deliver granulated superphosphate probably within a short time. It is possible to granulate the find ground superphosphate on every farm using a procedure developed in the Soviet Union. This procedure is better described in a tranalation of an article in the Soviet Agronomy fro m N.W. Popoff, which was published in No. 1 of "Hitchurin Field". If

we are in a position to tackle the problem of superphosphate granulation for achievement of larger harvest, this is only because the Soviet agricultural scientist, as friends of the German Democratic Republic, made their results available to us. These results are important, because they are not only considered to be of academic significance, but because they were practically proved immediately because of the close relation between science and practice in the Soviet Union.

The application of Lyssenko's studies now makes it possible to produce perfect seed potatoes in the exhausted fields of the German Democratic Republic through late seeding. The Jarowisation on a larger scale is of lesser importance for winter grain but will be applied in summer grain in order to obtain a larger harvest and to shorten the vegetation period, that is to achieve two harvests in one year. Jarowisation can save one year in two-year cultivations for seed production. Jarowisation of our seed cultures between spring and fall seeding will improve the soil fertility and insure the feed basis. The application of Lyssenko's teaching in modern plant cultivation will make it possible to produce new and improved varieties.

We were informed about a new method for improvement of drought resistance of cultivated plants in the Institute for Plant Physiology in Moscow.

Seeds are moistened so that they absorb water up to 50 percent of their weight, then they are dried until they reach their original weight. This procedure is repeated two to three times, very often once is enough. It was possible to increase the yield

with this seed treatment in dry areas of the Soviet Union by 100 percent, as for instance with sunflowers.

Numerous experiences have been made available to us by the Soviet Union. The Soviet results in the field of animal industry also are of great importance for us. The unselfish donation of these valuable results proves the unperturbable friendship of the great Soviet Union toward the German Democratic Republic. The application of these experiences makes it possible to fulfill the tasks of the Five-Year Plan in the interest of peace. To learn from the Soviet Union means to learn how to win.

PEST CONTROL IN THE FRUIT INDUSTRY

Doctor of Philosophy Luise
No. 22, Department for Protection of Garden Plants,
Billnitz.

(A) THE URGENT NEED FOR PEST CONTROL IN THE FRUIT INDUSTRY

We are working on fruit culture development at this time which should help to fulfill the Five-Year Plan ahead of time. Land, fertilizer and data are not the only prerequisites for the fulfillment of the fruit culture development plan. All this will not increase the production of fruit culture if we disregard pest control.

Pest control is, next to the selection of proper varieties and favorable soil conditions, the foundation for production of excellent and healthy fruit and thereby the basic condition for increasing the fruit crop. It is obvious that intensive fruit industry controls both fungi and animal parasites.

At the present time the situation is still more difficult in extensive fruit industry, which includes fruit culture by farmers, fruit culture in small gardens and along roads and highways. But it should be pointed out that the fruit industry along roads has made tremendous progress with regard to pest control through the action of district fruit technicians during the past two years. The frequent complaint of the practice is not unjustified, namely that all pest control is of questionable value if it is not conducted on trees along the rural roads. Pest control requires tools, money and time. But a real fruit grower has never denied the success that can be achieved. Even in farm fruit culture, the custom

to inspect the fruit trees only at fruit ripening time and to forget about them the rest of the time has disappeared.

(B) PEST AND DISEASE CONTROL IN THE FRUIT INDUSTRY

Every pest control is of problematic value if the necessary tools and insecticides are not available on time. Planning here is very important just as in any other work. The reserve of insecticides must be inspected and completed at the beginning of winter.

FIGURE 1

Scale, initial phase on apple, Laxtons Superb variety.

It is even better to replace every insecticide right after it has been used up. The following insecticides are absolutely necessary for the fruit industry: fruit carbolineum, Selinon, Cupral spray, lime sulphite spray or Polybar, Fuclasin F, Certoxan, Wofatox spray and powder.

Thanks to our industry the above eight insecticides, properly used, guarantee proper pest control.

As regards tools, the fruit industry is mostly dependent on sprayers. Dusting tools provide more economical control only against worms and on berry cultures. The tool depends upon the size of the enterprise . But it should be carefully taken into consideration whether a tool, we intend to buy, possesses the capacity required by the enterprise. Of course, the tools with higher capacity are more expensive than the tools of lower capacity. Therefore, it easily happens that the tools do not have the capacity required by the enterprise. Consequently, too much work and too much time is

required and very often the result is disappointment and failure to control pests.

A motor sprayer is the only tool for medium sized and large fruit cultures. In this case we suggest a horse drawn motor sprayer with a capacity of 10 to 40 atmospheres absolute pressure and holding about 300 liters. This machine is sufficient to spray up to 2000 large trees.

A handcart sprayer, capacity 80 to 100 liters and 8 to 12 atmospheres pressure, can be recommended for orchards with up to 250 trees if the terrain is not hilly.

A footboard sprayer, with about 6 atmospheres of pressure, can be suggested for smaller orchards or for local treatment as the control of blood lice very often requires. Such a board sprayer can be easily converted into a handcart model and thereby increase its capacity. The board sprayeris sufficient to spray about 160 full grown trees within one week.

For small gardens, smaller orchards and also for larger tree schools (here required in addition to the motor sprayer) the pack sprayer with pressure container, the so-called automatic pack sprayer, can be recommended. It works with a pressure of 4 to 10 atmospheres and holds 15 liters of spray. The efficiency is about the same as of the board sprayer.

A pack sprayer with a diaphragm or piston pump, which works without pressure, is very often used for vineyards and berry cultures. It is not possible to spray fruit trees with it. The Metosprayer can be mentioned here as one of this type.

1. Control of Diseases Caused by Fungi.

It is, of course, not possible to discuss the numerous fungus diseases of fruit cultures in this text. It is also not necessary if we keep in mind that the common scale spray schedule covers, with very few exemptions, all fungus diseases of fruit cultures. Here belong:

(a) Scale of pome and stone fruits (Fusicladium), Figure 1.

(b) Monilia fructigena on pome and stone fruits (preventive treatment,) Figure 2.

FIGURE 2

Monilia on apple, Laxtons Superb variety.

(c) Leptothyrium pomi on apple.

(d) Various storage rot

(e) White spot disease of pear, Mycosphaerella sentina.

(f) Leaf dots - Stigmetea - of pear, quince and cherries (Gnomonia).

(g) Clasterosporium on stone fruits.

(h) Glocosporium - antrachnosis of cherries.

(i) Leaf curl - Taphrina - of peach, plum, prune.

(k) Polystigma rubrum on prune leaves (meat spot disease).

The above-mentioned scale spray schedule should start with

1. Spraying as buds begin to swell, before blossoms appear. Such spraying will to a great extent prevent the first infection with fungi spores.

2. Pre-blossoming spraying should begin shortly before the buds open. Pome fruits still can be treated with 1 percent Cupral

spray. Copper free fungicide Fuclasin F of 0.75 percent dilution is suggested for stone fruits because some varieties are copper sensitive.

No spraying should be done during the blossom period so as not to injure the bees.

Immediately after most of the blossoms are off, the first post-blossom spraying should begin, using 0.5 percent Fuclasin F both for pome and stone fruits because of copper sensitivity of the foliage during the post-blossom period. 0.1 percent Cupral spray or lime sulphite can be added to the 0.5 percent Fuclasin for kernel-fruits without danger of burning the leaves in order to obtain stronger fungicide action during so-called scale years or in areas especially endangered by scale.

Three weeks after the blossom period the second post-blossom spraying should start, using the same chemicals and the same concentrations as for the first post-blossom spraying. In case of durable storing fruit, another late summer spraying, between July and August, is done with 0.5 percent Fuclasin F or 1 percent lime sulphite in order to prevent a late fungi infection.

However, all fungi diseases cannot be covered with this spray schedule, since the infection time and biology of the fungi cannot be subjected to strict rules. For example:

(a) The powdery mildew of the apple (Podosphaera leucotricha),

(b) Rust spots on the leaves and fruit of pears (Gymnosporangium sabinae) and of prunes (Puccinia),

(c) Destructive brown rots of stone fruits (homilia cinerea) and of quince (Sclerotinia linhartiana).

These fungi diseases can be controlled through repeated cutting, as in the case of brown rot, or by choosing a favorable location, as in rust fungi, or by frequent spraying with sulphur compounds. Last but not least, the fungi diseases of berry cultivations should be mentioned among the exceptions. Since the berry bushes foliage is very sensitive to copper and sulphur, spraying before the harvest or while the leaves are on should not be done. The antrachnose of currants (Pseudopexiza ribis) is controlled with 1 percent Cupral spray after harvest. The American destructive hop mildew on gooseberries (Sphaerotheca mors noae) can be controlled only through annual, radical cutting during winter time or with 10 percent lime sulphite spray before the leaves are out. It is not necessary to fight fungi diseases on strawberries since the white spot disease and hop mildew mostly do not appear until after harvest.

FIGURE 3

Web of apple web moth.

2. Control of Animal Parasites.

If it already was impossible to fully discuss the fungi diseases within the limits of this text; that is even more true of animal parasites. The old division into chewing and sucking parasites is still valid. However, the old principle of controlling the chewing parasites with peroral poisons and the sucking ones with contact poison should be considered from a different viewpoint at the present time. Arsenic as peroral poison and nicotine as contact poison belong to the past and are mentioned in our gardening schools only as historical facts. The entire progressive practice

of gardening has been using the results of our plant protection chemistry for quite a time, given as in form of modern and more perfect contact insecticides. We control both chewing and sucking parasites with contact insecticides and every gardener is already very familiar with DDT, Hexa and the Ester groups. Of course, the work of fruit tree spraying became considerably simpler since we can, for instance, control at the same time leaf lice and the spanworm. But these are not the only successes achieved by E compounds, Wofatox powder and Wofatox spray. It is no secret that the Red Spider invasion of our orchards considerably increased during the last years. DDT and other winter sprays favored the Red Spider by killing some natural enemies of this parasite. However, we are in a position to also control this parasite with 0.3 percent Wofatox spray or with Wofatox powder on berries.

Previously we were able to destroy the web moth (Hypomenta) - Figures 3 and 4 - only with fire or trimming the trees during winter time. But now we can control the parasite with 0.3 percent Wofatox spray or Wofatox dust on burning bushes. Still a third and a fourth example will show the tremendous progress that we have achieved with our E compounds, which possess a special deep action. It was possible previously to keep blood lice under control but only by hard local treatment with brushes. Now any fruit grower can destroy blood lice with one 0.3 percent Wofatox spray. It is also possible today to keep the sucking peach wasp (Hoplocampa varieties) under good control with E compounds. One 0.3 percent Wofatox spray is enough when all blossom leaves are off. Our E compounds are, of course, able to kill most other parasites. There are certain difficulties in controlling the cherry-weevil and the apple-caterpillar.

FIGURE 4

Apple web moth, nymph cocoons and butterflies.

This is not because the compounds did not possess the required ability but because of the complicated biology of the parasites. It is a problem that will undoubtedly be solved by our science. Another difficulty is the ability of the parasites to adapt themselves to insecticides.

The winter spraying is the basis for control of animal parasites. Before the buds start swelling up, fruit carbolineum is used: 6 percent for stone and 8 percent for pome fruits. Selinon has an advantage compared with carbolineum since it can be used when the buds have already started swelling up, but only as a 0.5 percent solution. A mixture of 0.5 percent Selinon solution with 0.5 percent Certoxan solution during the same period adequately controls the apple blossom corer. A misture of 4 percent carbolineum solution with 0.5 percent Selinon solution can be recommended before the buds start swelling up and in this case carbolineum acts as an air seal and Selinon as cell protoplasma poison, a combination proved to be especially effective for the destruction of winter parasites while in a latent condition. We should point out with regard to winter spraying, which is a legal obligation in the entire German Democratic Republic, that it is intended to be used only against the animal parasites which are on fruit trees during winter time. There is sometimes an erroneous belief among fruit peasants, that Selinon also is a fungicide. Selinon and fruit tree carbolineum are contact poisons only.

3. Prevention of Physiological Disturbances.

Physiological disturbances are damages caused by lifeless surroundings. It is sometimes hard to distinguish these from damages by parasites. The fruit farmer must be able to know the difference. Frost damages can occur for instance in the form of frost cracks or frost plates. Various measures for frost prevention can help such as artificial warmth or painting of trunks with a lime solution. But it is about time to eradicate an old error of practical fruit growers with regard to lime coating of the trunks. It never acts as an insecticide but eliminates the tensions in the tree caused by cold nights and subsequent sunshine during daytime.

Too high heat also can cause sunburn damages on fruits. This is very well known to every gooseberry or apple grower. The gooseberries hang from the bush as though they were boiled and apples get covered with round spots under which the tissue becomes necrotic.

Water supply variations exceeding the normal measure can cause grave damages. Constantly moist soil is absolutely unsuitable for fruit and especially for stone fruit. The low oxygen content of the constantly moist soil causes grave damages. It prevents the growth of shoots, causes Monilia and canker development and gum flow. Long draughts are especially dangerous for apples and prunes on light soils. The fruits fall off. Good irrigation can save some. A sudden and plentiful water supply after prolonged dry periods can cause stresses and lacerations in the tissue of pome and stone fruit.

We cannot deal here in details with various influences of the soil resulting from lack or surplus. Soil examinations will inform the fruit grower of eventual minuses which can be corrected. We

mention as the only example the leaf in disease of gooseberries and currants which indicate the use of chlorine containing fertilizers or the lack of potassium. Finally we should mention here the incorrect use of insecticides which can cause enormous damages. In connection with this, the principle "Much helps much" must be energetically eradicated. The concentrations to be used, time of spraying and the temperature should be strictly observed. Otherwise the fruit grower himself is responsible for the crop failure. The physiological disturbances cannot be controlled. But the common sense of the fruit grower can prevent them.

(C) THE FUTURE OF PEST CONTROL IN THE FRUIT INDUSTRY

From all that has been mentioned, tremendous progress and results of plant protection science have been made which are to the largest extent available to the fruit grower. In addition to the various existent difficulties there is a justified wish on the part of fruit growers still unfulfilled. The advantages of the Wofatox E compound spray were described. But this compound cannot be mixed with any other spray as for instance the fungicides. However, the fruit grower should be able - for economic reasons - to include the insecticides into the spray schedule mentioned under B1. A separate spraying is only possible in special cases. But the situation does not seem to be hopeless. There is hope, we assume, that miscible E compounds will be available to our fruit growers sometime in 1952.

Plant protection chemistry is seriously working on the problem of combining the prolonged action of DDT agents with the strong instant action of the Hexa compounds in form of Hexa-DDT mixtures. Hexa-Ester mixtures are desirable for the same reason.

The science has made many progressive steps in the work accomplished. Much more is to follow. But the fruit grower should not sceptically accept the innovations. He should and must make them his own. The yield of his trees rewards him, but his greatest reward is the consciousness that he has contributed to the fulfillment of the Five-Year Plan as much as he could.

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The photos are from the archive of the Garden Plant Protection Department of the Experimental and Research Institute for Gardening, Dresden-Billnitz.